

WHAT IS CLAIMED IS:

Claim 1: A system for producing a raster-type laser scanning pattern for scanning 2-D bar code symbols, said system comprising:

5 a housing;

a light source disposed in said housing, for producing a light beam having cross-sectional characteristics suitable for scanning a 2-D bar code symbol bar code symbol;

10 a first light beam scanning mechanism, disposed in said housing and responsive to a first control signal, for scanning said light beam along a first reference direction using a first scanning element;

a second light beam scanning mechanism, disposed in said housing and responsive to a second control signal, for scanning said light beam along a second reference direction orthogonal to said first reference direction using a second scanning element;

15 light collecting means disposed in said housing, for collecting light reflected off a bar code symbol scanned by said scanning pattern;

light detecting means disposed in said housing, for detecting said collected light and producing scan data indicative of the intensity of said detected light; and

20 electronic scanning mechanism control circuitry, disposed in said housing, for electrically controlling the operation of said first and second scanning elements so as to produce a raster-type scanning pattern for scanning said 2-D bar code symbol.

25 Claim 2: The system of claim 1, wherein said electronic scanning mechanism control circuitry electrically controls said first and second scanning elements in a synchronous manner so that said raster-type scanning pattern as a whole is substantially free of movement relative to said housing.

30 Claim 3: The system of claim 1, wherein said electronic scanning mechanism control circuitry electrically controls said first and second scanning elements in an asynchronous manner so that said raster-type scanning pattern as a whole moves back and forth along relative to said housing so as to improve the scanning of said 2-D bar code symbol when supporting said housing within the hand-of an operator.

Claim 4: The system of claim 1, wherein said light beam is a laser beam.

35 Claim 5: The system of claim 1, wherein said housing is hand-supportable.

Claim 6: The system of claim 1, wherein said housing is body-wearable.

Claim 7: The system of claim 1, said scanning pattern is a 1D scanning pattern.

5 Claim 8: The system of claim 1,

wherein said first reference direction is along the x axis direction of the system and said second reference direction is along the y axis direction of the system;

wherein said first light beam scanning mechanism comprises a first electromagnetically driven coil for driving said first scanning element, and said second light beam scanning
10 mechanism comprises a second electromagnetically driven coil for driving said second scanning element; and

wherein said electronic scanning mechanism control circuitry comprises a electronically-controlled potentiometer for producing a y-axis drive voltage signal having periodically incrementing and decrementing characteristics, for driving said second scanning element along
15 said y axis direction.

Claim 9: The system of claim 8, wherein said electronic scanning mechanism control circuitry comprises means for generating a plurality of y-axis drive voltage signals, each for driving said second scanning element at a different scan rate.

20 Claim 10: The system of claim 8, wherein said electronic scanning mechanism control circuitry further comprises a push-pull type drive circuit for producing a x-axis drive voltage signal having a periodic characteristics, for driving said first scanning element along said x axis direction.

25 Claim 11: The system of claim 10, wherein said y-axis drive voltage signal increments in small quantized voltage level steps in response to a control signal generated independently from said x-axis drive voltage signal.

30 Claim 12: The system of claim 10, wherein said first scanning element comprises a first mechanically-damped scanning element supported at one end from a first fixed anchoring structure, and driven in an off-resonant manner by said first electromagnetically driven coil; and wherein second scanning element comprises a second mechanically-damped scanning element supported at one end from a second fixed anchoring structure, and driving in an off-resonant
35 manner said second electromagnetically driven coil.

Claim 13: The system of claim 12, wherein said first fixed anchoring structure and said second fixed anchoring structure are provided on a common support platform, in close proximity with each other.

5 Claim 14: The system of claim 13, wherein said common support platform comprises an optical bench.

Claim 15: The system of claim 1, wherein said housing is a miniature enclosure that can be supported on the hand of an operator.

10 Claim 16: A method of automatically producing a raster-type scanning pattern, comprising the steps of:

(a) producing a light beam having cross-sectional characteristics suitable for scanning said 2-D bar code symbol;

15 (b) scanning said light beam along a first reference direction using a first light beam scanning mechanism responsive to a first control signal and having a first scanning element;

(c) scanning said light beam along a second reference direction orthogonal to said first reference direction using a second light beam scanning mechanism responsive to a second control signal and having a second scanning element, so that a scanning pattern is produced for scanning said 2-D bar code symbol;

20 (d) electrically controlling said first and second scanning elements so as to produce a 2-D raster-type scanning pattern having a number of scan lines proportional to the number of rows determined in said scanned 2-D bar code symbol;

(e) collecting light reflected off a bar code symbol scanned by said scanning pattern;

25 (f) detecting said collected light and producing scan data indicative of the intensity of said detected light; and

(g) processing said scan data so as to determine the number of rows of data in said scanned 2-D bar code symbol, and produce control data indicative thereof.

30 Claim 17: The method of claim 16, wherein during step (c) said scanning pattern is a 1D scanning pattern, and during step (g) said 2-D scanning pattern is a raster-type 2-D scanning pattern.

35 Claim 18: The method of claim 16, wherein during step (c) said scanning pattern is a raster-type 2-D scanning pattern having a first number of scan lines, and during step (g) said raster-

type 2-D scanning pattern has a second number of scan lines which is greater than said first number of scan lines.

5 Claim 19: A system for automatically producing a raster-type scanning pattern having a number of scan lines matched to the number of rows of data contained in a 2-D bar code symbol being scanned, said system comprising:

a housing;

a light source disposed in said housing, for producing a light beam having cross-sectional characteristics suitable for scanning said 2-D bar code symbol;

10 a first light beam scanning mechanism, disposed in said housing and responsive to a first control signal, for scanning said light beam along a first reference direction using a first scanning element:

15 a second light beam scanning mechanism, disposed in said housing and responsive to a second control signal, for scanning said light beam along a second reference direction orthogonal to said first reference direction using a second scanning element, so as to produce a scanning pattern for scanning said 2-D bar code symbol;

light collecting means disposed in said housing, for collecting light reflected off a bar code symbol scanned by said scanning pattern;

20 light detecting means disposed in said housing, for detecting said collected light and producing scan data indicative of the intensity of said detected light;

scan data processing means disposed in said housing, for processing said scan data and determine the number of rows of data in said scanned 2-D bar code symbol, and produce control data indicative thereof; and

25 scanning mechanism control means, disposed in said housing and responsive to said produced control data, for electrically controlling said first and second scanning elements so as to produce a raster-type scanning pattern having a number of scan lines proportional to the number of rows determined in said scanned 2-D bar code symbol.

30 Claim 20: The system of claim 19, wherein said number of scan lines is at least two.

Claim 21: The system of claim 19, wherein said light beam is a laser beam.

Claim 22: The system of claim 19, wherein said housing is hand-supportable.

35 Claim 23: The system of claim 19, wherein said housing is body-wearable.